NAME:

For the following exercises, read the problems carefully and show all your work. Attach more pages if necessary. Avoid using a calculator or the computer to solve the exercises. Please, turn in ONE pdf.

1 Cartesian Coordinates/Geometry, Lines

1. Find the line that goes through the points $(-1.75, -0.5)$ and $(0.65, 4.3)$.

2. For the equation $y = 2^x - x$, fill out the following table:

x	y
	1
	2
-1	
-2	

3. Using the table created above, draw a plot for $y = 2^x - x$ for $x \in [-2, 2]$.

4. Say you were interested in the relationship between the amount of federal grant funds distributed by executive agencies in a jurisdiction and mean annual income. Suppose after collecting data and fitting a regression, you determined the relationship to be

$$Y = 2.3 + 0.5x,$$

where Y is the amount of federal grants distributed in millions and x is mean annual income in units of $1,000$. Draw a graph showing this relationship for $x \in [0, 100]$ (it may be useful to use units of ten when labeling the axes). How much federal grant money is distributed to juristidictions with a mean annual income of \$25,000? \$50,000? \$100,000?

2 Sets

1. Let $U = \{i \in \mathbb{N} : 0 < i < 11\}$, $A = \{1, 3, 5, 7\}$, and $B = \{i \in \mathbb{N} : 1 < i < 10\}$.

   (a) Find $A \cup B$.

   (b) Find $A \cap B$.

   (c) Depict these sets in a Venn diagram.

2. For any two sets A and B, what if anything can we say about $B \setminus (B \setminus A)$?

3. For any three sets A, B, and C, what if anything can we say about $A \cup B \cap C$?

4. Express the function $y = 2x + 6$ as a set.

3 Functions

1. Factor $-7\theta^2 + 21\theta - 14$

2. FOIL: $(2x - 3)(5x + 7)$

3. Factor: $q^2 - 10q + 9$

4. Factor and reduce: $\frac{\beta - \alpha}{\alpha^2 - \beta^2}$

5. Solve: $15\delta + 45 - 5\delta = 36$

6. Solve: $0.30\Omega + 0.05 = 0.25$

7. Solve: $-4x^2 + 64 = 8x - 32$

8. Complete the square and solve: $x^2 + 14x - 14 = 0$

9. Complete the square and solve: $1/3y^2 + 2/3y - 16 = 0$

10. Solve using the quadratic forumla: $2x^2 + 5x - 7$

Solve for x:

11. $x^2 = 1$

12. $(x - 1)(x + 2) = 0$

13. $3x^2 - 1 = 6x + 8$

Expand then simplify the following expressions:

14. $(x + 3)(x - 4)$

15. $(5x + 1)(2x - 1)$

16. $(x + 1)(x + y + 1)$

Solve the following formulas:

17. $5 + 11x = -3x^2$

18. $\sqrt{4x + 13} = x + 2$

19. $10^{3x^2}10^x = 100$

20. $6x^2 - 6x - 6 = 0$

21. $5 + 11x = -3x^2$

22. Find the inverse of $f(x) = 5x - 2$

23. Simplify $h(x) = g(f(x))$, where $f(x) = x^2 + 2$ and $g(x) = \sqrt{x - 4}$.

24. Simplify $h(x) = f(g(x))$ with the same f and g. Is it the same as before?

25. Rewrite the following by taking the log of both sides. Is the result a linear function?

$$y = \alpha \times x_1^{\beta_1} \times \beta_2 x_2 \times \beta_3 x_3$$

26. Rewrite the following by taking the log of both sides. Is the result a linear function?

$$y = \alpha \times x_1^{\beta_1} \times \frac{x_2^{\beta_2}}{x_3^{\beta_3}}$$